

CLAIMS

**WHAT IS CLAIMED:**

1. A method for planning a mission profile in real time, comprising:  
ascertaining a plurality of target information, including a target location, a target  
velocity, and a target location error; and  
autonomously determining a pattern from the ascertained target information.

*of what?*

2. The method of claim 1, wherein ascertaining the target information includes  
assuming a value for at least one of the target velocity and the target location error.

3. The method of claim 1, wherein ascertaining the plurality of target information  
includes ascertaining a target location that places the target in the air, on the surface, or  
submerged underwater.

4. The method of claim 1, wherein ascertaining the plurality of target information  
includes receiving at least one of the target location, target velocity, and target location error  
in a transmission.

5. The method of claim 1, further comprising:  
dispensing at least a formation including at least one vehicle; and  
implementing the pattern with the vehicle.

6. The method of claim 5, wherein ascertaining the target information includes:  
acquiring the target information at a platform from which the formation is dispensed;  
receiving at least the target location from a platform other than the platform from  
which the formation is dispensed; or  
acquiring the target information aboard the vehicle.

7. The method of claim 5, wherein dispensing the formation includes:  
launching the formation from an airborne platform; or  
launching the formation from a surface-based platform; or  
launching the formation from an underwater platform.

1           8.     The method of claim 5, wherein the vehicle includes a vehicle selected from  
2     the group consisting of a submersible vehicle, a reconnaissance drone, a flying submunition,  
3     a cruise missile, and a smart bomb.

1           9.     The method of claim 1, wherein autonomously determining the pattern from  
2     the ascertained target information includes autonomously determining a serpentine pattern or  
3     a fan blade pattern. *how, why, what?*

1           10.    The method of claim 1, wherein autonomously determining the pattern from  
2     the ascertained target information includes:

3           projecting along a target axis a direction opposite a target heading defined by the  
4           target velocity a distance of at least twice the target location error to establish  
5           an intersection of the target axis with the target location error;  
6           projecting left and right relative to the target axis from the intersection a distance at  
7           least as great as one-half the target location error to determine a pair of  
8           possible start points;  
9           selecting the possible start point closest to the platform;  
10          determining a dispense point;  
11          laying out a trace from the selected start point; and  
12          translating the trace along a heading defined by the target velocity a distance  
13          determined by the elapsed time of travel for the platform to the dispense point  
14          and for a vehicle from the dispense point to the start point.

1           11.    The method of claim 10, further comprising:  
2           dispensing a formation including at least one vehicle, at the dispense point defined by  
3           the preplanned mission profile; and  
4           implementing the pattern with the formation at the selected start point.

1           12.    The method of claim 11, further comprising adjusting the selected start point  
2     by a predetermined distance along a leg of the trace.

1           13.    The method of claim 10, wherein projecting along the target axis opposite the  
2     target heading includes projecting 180° relative to the target heading.

1 14. The method of claim 10, wherein projecting left and right includes projecting  
2  $\pm 90^\circ$ .

1 15. The method of claim 1, further comprising identifying the target.

1 16. The method of claim 15, wherein identifying the target includes employing an  
2 automatic target recognition system.

1 17. The method of claim 15, further comprising attacking the target.

1 18. A method for planning a mission profile in real time, comprising:

2 ascertaining a plurality of target information, including a target location, a target  
3 velocity, and a target location error; and  
4 autonomously determining a pattern including a trace from the ascertained target  
5 information, including: 112

6 projecting along a target axis a direction opposite a target heading defined by  
7 the target velocity a distance of at least twice the target location error  
8 to establish an intersection of the target axis with the target location  
9 error;

10 projecting left and right relative to the target axis from the intersection a  
11 distance at least as great as one-half the target location error to  
12 determine a pair of possible start points;

13 selecting the possible start point closest to the platform;

14 determining a dispense point;

15 laying out a trace from the selected start point; and

16 translating the trace along a heading defined by the target velocity a distance  
17 determined by the elapsed time of travel for the platform to the  
18 dispense point and for a vehicle from the dispense point to the start  
19 point.

1 19. The method of claim 18, wherein ascertaining the target information includes  
2 assuming a value for at least one of the target velocity and the target location error.

1           20.    The method of claim 18, wherein ascertaining the plurality of target  
2 information includes ascertaining a target location that places the target in the air, on the  
3 surface, or submerged underwater.

1           21.    The method of claim 18, wherein ascertaining the plurality of target  
2 information includes receiving at least one of the target location, target velocity, and target  
3 location error in a transmission.

1           22.    The method of claim 18, further comprising:  
2 dispensing at least a formation including at least one vehicle; and  
3 implementing the pattern with the vehicle.

1           23.    The method of claim 22, wherein ascertaining the target information includes:  
2 acquiring the target information at a platform from which the formation is dispensed;  
3 receiving at least the target location from a platform other than the platform from  
which the formation is dispensed; or  
acquiring the target information aboard the vehicle.

1           24.    The method of claim 22, wherein dispensing the formation includes:  
2 launching the formation from an airborne platform; or  
3 launching the formation from a surface-based platform; or  
4 launching the formation from an underwater platform.

1           25.    The method of claim 22, wherein the vehicle includes a vehicle selected from  
2 the group consisting of a submersible vehicle, a reconnaissance drone, a flying submunition,  
3 a cruise missile, and a smart bomb.

1           26.    The method of claim 18, wherein autonomously determining the pattern from  
2 the ascertained target information includes autonomously determining a serpentine pattern or  
3 a fan blade pattern.

1           27.    The method of claim 18, further comprising:  
2 dispensing a formation including at least one vehicle at the dispense point defined by  
3 the preplanned mission profile; and  
4 implementing the pattern with the formation at the selected start point.

1           28.     The method of claim 27, further comprising adjusting the selected start point  
2     by a predetermined distance along a leg the trace.

1           29.     The method of claim 18, wherein projecting along the target axis opposite the  
2     target heading includes projecting 180° relative to the target heading.

1           30.     The method of claim 18, wherein projecting left and right includes projecting  
2     ±90°.

1           31.     The method of claim 18, further comprising identifying the target.

1           32.     The method of claim 31, wherein identifying the target includes employing an  
2     automatic target recognition system.

33.     The method of claim 31, further comprising attacking the target.

34.     An apparatus for use in planning a mission profile in real time, comprising:  
a receiver capable of receiving a plurality of target information, the target information  
including a target location;  
a computing device; and  
a program storage device encoded with instructions that, when executed by the  
computing device, perform a method for autonomously determining a pattern  
from the target information.

1           35.     The apparatus of claim 34, wherein the method for autonomously determining  
2     the pattern from the target information includes assuming a value for at least one of a target  
3     velocity and a target location error.

1           36.     The apparatus of claim 34, wherein the receiver, the computing device, and  
2     the program storage device are distributed across a platform and a vehicle.

1           37.     The apparatus of claim 36, wherein the platform is an airborne platform, a  
2     surface platform, or a submerged platform.

1           38.     The apparatus of claim 36, wherein the vehicle includes a vehicle selected  
2     from the group consisting of a submersible vehicle, a reconnaissance drone, a flying  
3     submunition, a cruise missile, and a smart bomb.

1           39.     The apparatus of claim 34, wherein the receiver, the computing device, and  
2     the program storage device comprise a portion of a platform.

1           40.     The apparatus of claim 39, wherein the platform is an airborne platform, a  
2     surface platform, or a submerged platform.

1           41.     The apparatus of claim 34, wherein the receiver, the computing device, and  
2     the program storage device comprise a portion of a vehicle.

1           42.     The apparatus of claim 41, wherein the vehicle includes a vehicle selected  
2     from the group consisting of a submersible vehicle, a reconnaissance drone, a flying  
3     submunition, a cruise missile, and a smart bomb.

1           43.     The apparatus of claim 34, wherein the encoded method for autonomously  
2     determining the pattern from the ascertained target information includes autonomously  
3     determining a serpentine pattern or a fan blade pattern.

1           44.     The apparatus of claim 34, wherein the encoded method for autonomously  
2     determining the pattern includes:

3                 projecting along a target axis 180° off the target velocity a distance of at least twice  
4                 the target location error to establish an intersection of the target axis with the  
5                 target location error;

6                 projecting left and right relative to the target axis from the intersection a distance at  
7                 least as great as one-half the target location error to determine a pair of  
8                 possible start points;

9                 selecting the possible start point closest to the platform;

10                determining a dispense point;

11                laying out a trace from the selected start point; and

12                translating the trace along a heading defined by the target velocity a distance  
13                determined by the elapsed time of travel for the platform to the dispense point  
14                and for a vehicle from the dispense point to the start point.

1           45.     The apparatus of claim 44, wherein the encoded method for autonomously  
2     determining the pattern further comprises adjusting the selected start point by a  
3     predetermined distance along a leg of the trace.

1           46.    The apparatus of claim 44, wherein the projecting along the target axis  
2           opposite the target heading in the encoded method includes projecting 180° relative to the  
3           target heading.

1           47.    The apparatus of claim 44, wherein projecting left and right in the encoded  
2           method includes projecting  $\pm 90^\circ$ .

1           48.    The apparatus of claim 34, further comprising an automatic target recognition  
2           system.

1           49.    The apparatus of claim 48, wherein the method for autonomously determining  
2           the pattern further comprises identifying the target.

1           50.    An apparatus for planning a mission profile in real time, comprising:  
2           a receiver capable of receiving a plurality of target information, the target information  
3           including a target location;  
4           a computing device; and  
5           a program storage device encoded with instructions that, when executed by the  
6           computing device, perform a method for autonomously determining a pattern  
7           from the ascertained target information, the method including:  
8           projecting along a target axis a direction opposite a target heading defined by  
9           the target velocity a distance of at least twice the target location error  
10          to establish an intersection of the target axis with the target location  
11          error;  
12          projecting left and right relative to the target axis from the intersection a  
13          distance at least as great as one-half the target location error to  
14          determine a pair of possible start points;  
15          selecting the possible start point closest to the platform;  
16          determining a dispense point;  
17          laying out a trace from the selected start point; and  
18          translating the trace along a heading defined by the target velocity a distance  
19          determined by the elapsed time of travel for the platform to the  
20          dispense point and for a vehicle from the dispense point to the start  
21          point.

112  
?

1           51.     The apparatus of claim 50, wherein the method for autonomously determining  
2     the pattern from the target information includes assuming a value for at least one of a target  
3     velocity and a target location error.

1           52.     The apparatus of claim 50, wherein the receiver, the computing device, and  
2     the program storage device are distributed across a platform and a vehicle.

1           53.     The apparatus of claim 52, wherein the platform is an airborne platform, a  
2     surface platform, or a submerged platform.

1           54.     The apparatus of claim 52, wherein the vehicle includes a vehicle selected  
2     from the group consisting of a submersible vehicle, a reconnaissance drone, a flying  
3     submunition, a cruise missile, and a smart bomb.

1           55.     The apparatus of claim 50, wherein the receiver, the computing device, and  
2     the program storage device comprise a portion of a platform.

1           56.     The apparatus of claim 55, wherein the platform is an airborne platform, a  
2     surface platform, or a submerged platform.

1           57.     The apparatus of claim 50, wherein the receiver, the computing device, and  
2     the program storage device comprise a portion of a vehicle.

1           58.     The apparatus of claim 57, wherein the vehicle includes a vehicle selected  
2     from the group consisting of a submersible vehicle, a reconnaissance drone, a flying  
3     submunition, a cruise missile, and a smart bomb.

1           59.     The apparatus of claim 50, wherein the method for autonomously determining  
2     the pattern from the ascertained target information includes autonomously determining a  
3     serpentine pattern or a fan blade pattern.

1           60.     The apparatus of claim 50, wherein the method for autonomously determining  
2     the pattern further comprises adjusting the selected start point by a predetermined distance  
3     along a leg of the trace.

1           61.     The apparatus of claim 50, wherein projecting along the target axis opposite  
2     the target heading in the encoded method includes projecting  $180^\circ$  relative to the target  
3     heading.

1           62.     The apparatus of claim 50, wherein projecting left and right in the encoded  
2     method includes projecting  $\pm 90^\circ$ .

1           63.     The apparatus of claim 50, further comprising an automatic target recognition  
2     system.

1           64.     The apparatus of claim 63, wherein the method for autonomously determining  
2     the pattern further comprises identifying the target.

1           65.     An apparatus capable of planning a mission profile in real time, comprising:  
2     a platform, including

3                 a receiver capable of receiving a plurality of target information, the target  
4                 information including a target location;

5                 a first computing device; and

6                 a first program storage device encoded with instructions that, when executed  
7                 by the computing device, perform a method for autonomously  
8                 determining a pattern from the ascertained target information, the  
9                 method including: *112*

10                projecting along a target axis a direction opposite a target heading  
11                defined by the target velocity a distance of at least twice the  
12                target location error to establish an intersection of the target  
13                axis with the target location error;

14                projecting left and right relative to the target axis from the intersection  
15                a distance at least as great as one-half the target location error  
16                to determine a pair of possible start points;

17                selecting the possible start point closest to the platform;

18                determining a dispense point;

19                laying out a trace from the selected start point; and

20                translating the trace along a heading defined by the target velocity a  
21                distance determined by the elapsed time of travel for the

platform to the dispense point and for a vehicle from the  
dispense point to the start point; and  
a vehicle, including:  
a second program storage device capable of being encoded with the pattern by  
the first computing device; and  
a second computing device capable of implementing the pattern encoded on  
the second program storage device through control of the vehicle.

66. The apparatus of claim 65, wherein the method for autonomously determining  
the pattern from the target information includes assuming a value for at least one of a target  
velocity and a target location error.

67. The apparatus of claim 65, wherein the platform is an airborne platform, a  
surface platform, or a submerged platform.

68. The apparatus of claim 65, wherein the vehicle includes a vehicle selected  
from the group consisting of a submersible vehicle, a reconnaissance drone, a flying  
submunition, a cruise missile, and a smart bomb.

69. The apparatus of claim 65, wherein the method for autonomously determining  
the pattern from the ascertained target information includes autonomously determining a  
serpentine pattern or a fan blade pattern.

70. The apparatus of claim 65, wherein the method for autonomously determining  
the pattern further comprises adjusting the selected start point by a predetermined distance  
along a leg of the trace.

71. The apparatus of claim 65, wherein projecting along the target axis opposite  
the target heading in the encoded method includes projecting 180° relative to the target  
heading.

72. The apparatus of claim 65, wherein projecting left and right in the encoded  
method includes projecting  $\pm 90^\circ$ .

73. The apparatus of claim 65, further comprising an automatic target recognition  
system.

1           74.    The apparatus of claim 73, wherein the method for autonomously determining  
2 the pattern further comprises identifying the target.

1           75.    An apparatus for planning a mission profile in real time, comprising:  
2 means for ascertaining a plurality of target information, including a target location, a  
3 target velocity, and a target location error; and  
4 means for autonomously determining a pattern from the ascertained target  
5 information.

112